



Ocean Current Tracking Using Temperature

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Abstract

For this project pairs of temperature and photometric sensors were placed at five sites at depths of 4-6m at a reef near Lahaina, Maui, as well as one sensor pair place on land near the reef site. These sensors logged data every 5 minutes, with the temporal shifts between features of temperature profiles at different sites used to estimate current velocity between sites. The location of each sensor was recorded using GPS data supplemented with a visual map of the reef, with the average separation between sensors being on the order of hundreds of meters. The interpolated current velocities between sensor sites can then be used to make a small-scale vector map of local currents at the reef site, potentially allowing for the tracing of point source pollution from coastal sources.

Introduction

As water travels with the current the temperature doesn't change much if at all. With this knowledge the temperature can be inferred. If a peak temperature is measured and then is the same or very similar some time later in a different location, the time it takes to get from the first location to the second is the current speed.

What's Next?

Next the direction of the current, the speed of the current, and the locations of the sensors will be compared to a map of the reefs and Maui coast. It is basically tracking the current back to its source.

References

- Reefquest team
- Onset HOBO data logger

Results

Since the data collected was over a couple of weeks, there is not one current speed or direction, but instead velocity as a function of time and the direction as a function of time. The current gradually increases and then decreases. At the end it grows exponentially which is due to calculation errors with fitting equations to the plotted points. When trying to find the best function for the graphs, seen to the left, the equation as x grows will grow exponentially as there are no more points to account for. This is why there is error at the end of the velocity and direction graphs.

